

IV. *Revision of the species included in the genus Tropisternus* (fam. Hydrophilidæ). By D. SHARP.

[Read December 6th, 1882.]

IN working out the *Hydrophilidæ* for the 'Biologia Centrali-Americana,' I found so much difficulty in discriminating the species of *Tropisternus*, and such great confusion prevailing about those already described, or, perhaps I should rather say, named, that I have been obliged to submit the whole of the genus to a careful revision. For this purpose I have used only the specimens extant in my own collection, and a set of types of the North American species kindly lent me by Dr. Horn: but as several of the older French collections have come into my possession, I have had sufficient material to enable me to elucidate most of the species enumerated in the Munich Catalogue, and to distinguish a few new ones. The difficulty of identifying the older descriptions is extreme; for these insects, like most other water-beetles, are very similar to one another in colour, form, and such minor characters as in other families of Coleoptera are readily perceived, and make the distinction of species by cursory inspection easier than it is in the case of the water-beetles. Careful examination has revealed some important characters for grouping the species, and when the structural characters, by which the members of the different groups are characterised, are appreciated, the task of discriminating the species becomes comparatively easy, for it is frequently species of two quite different groups that bear the greatest superficial resemblance to one another. Even after all my efforts, however, I leave a great many questions of specific identity unsolved, and it is quite possible that the species are considerably more numerous than those the method I have adopted has induced me to promulgate. Among the first points to which I directed my attention was the finding of an external means of distinguishing the two sexes; for the front feet, which are usually of such assistance for this purpose, are in *Tropi-*

sternus quite similar in the males and females. I have found, however, that in the males of a great number of the species there is a small tooth or spine on the under surface of the inner claw on the hinder and middle feet; and although there are a few species in which I have not detected this external sexual mark, I believe it will ultimately be found to exist in all species of the genus. In a few species there is a peculiar sexual difference in the sculpture of the mentum, the males having this part more densely punctate than the other sex. These are the only certain external sexual characters I have been able to detect.

In the hope that the structure of the œdeagus might afford a means of distinguishing the species, I have examined it in several forms selected for the purpose, but I find that not only is this organ remarkably minute in the species of this genus, but that it is also excessively similar even in very widely different species.

The difficulty of distinguishing the species is increased by the fact that two forms of what I may call adventitious sculpture exist in certain individuals of several species. The first of these peculiar sculptures is a pitting of the surface, giving rise to a variolose appearance, and often occurring with great regularity over the whole of the upper surface; this peculiarity, which is not, I believe, variation, but more probably dependent on some physical condition to which the specimen possessing it is subjected during its metamorphosis from the pupal condition, occurs in numerous other *Hydrophilidæ* and *Dytiscidæ*, and is not unfrequently alluded to by describers as being a specific character. The second form of adventitious sculpture consists in the appearance in certain individuals of two lines of punctures near the outer margin of the wing-case, or near the suture; this character also can scarcely be considered variation, but I believe it depends on the fact that although the species of the genus appear externally to be without series of punctures on the wing-cases, yet in reality these exist in the interior of this part (they are in fact more or less conspicuous on the inner face of the wing-case according to the condition of the membrane covering this face) and become occasionally evident externally if the chitinous substance be a little thinner than usual, or from some other cause.

After eliminating these sources of confusion, and after

arranging the species in groups, there is still much difficulty in distinguishing the species, owing to the variability in some other points. The most important of these is the spine or carina frequently apparent on the last ventral segment; this in certain species, e. g., *H. apicipalpis*, is very constant in its size and form, but in others (especially in *H. lateralis*) it is excessively variable, unless it be the case that more than one species is mixed together in these cases of apparent variability. There seems some probability that this latter may be the case, because in the species last named the crest is quite absent in South American individuals, but is nearly always present in individuals from the United States of North America. In Central American individuals it is present in various degrees of development.

A fact of some interest is the presence in numerous species of the genus of an excessively fine squamosity on the polished surfaces of the hind tibiae and tarsi. This is somewhat similar to what we find existing more conspicuously in *Eretes*, of the family *Dytiscidae*; it is excessively delicate and very easily removed, and is of interest to the evolutionist inasmuch as it may be considered to be the remnant of a structure formerly more developed, but now in process of disappearing. This peculiarity may be well observed in the common species, *T. nitens*, Cast.

It is still more interesting to observe that in the case of *Eretes* and *Tropisternus* this peculiarity of the squamose swimming legs is accompanied by another common to the two, and almost (if not altogether) confined to them amongst their allies, *viz.*, the existence on the epipleural margin of short rigid spines. In the *Tropisterni* each of these spines is inserted in a large puncture or depression, the shape of which apparently adapts it to receive the spine when depressed, and there is no doubt these spines are mobile and capable of being depressed or erected; these peculiarities present some valuable specific characters, and may be seen to advantage in *Hydrophilus apicipalpis*.

In discussing the characters of some of the species I have made use, in speaking of some punctures on the head and thorax, of the term "systematic punctures"; I allude by this to some punctures which are present with great constancy in the *Hydrophilidae* on these parts

of the body. On the head there is a series on the clypeus commencing on each side in front of the eye and extending forwards, till near the front of the clypeus it changes its direction by a curve, extending backwards, and converging with its fellow of the other side towards the mesial line of the back of the clypeus; besides this looped series there is a patch of punctures on the inner margin of the eye; on the thorax there is a lateral line of punctures placed at a little distance from the side about the middle of the length, and there is also an anterior series consisting of two or three punctures placed near the front of the thorax behind the eye on each side. I have not made so much use, as I think I might have done with advantage, of these systematic punctures, and content myself with pointing them out and recommending that attention should be paid to them by future students.

As regards the validity of the genus *Tropisternus*, I must say that though it has not been admitted by some of our best entomologists, it appears to me incontestable. It was established by Solier in the 'Annales de la Société entomologique de France,' 1834, p. 308, by a dismemberment from *Hydrophilus*, in which its species had before been included; it differs from *Hydrophilus* by the different proportions of the articulations of the maxillary palpi, the penultimate joint of which is shorter than the terminal one, while in *Hydrophilus* the contrary proportion prevails; the ventral segments in *Tropisternus* are entirely pubescent, while in *Hydrophilus* they always have a large glabrous area. There are also other minor differences, of which an important one is the size of the individuals: the largest *Tropisternus* only attains about 15 mm. of length, while the smallest *Hydrophilus* has about 25 mm., and the largest attains about 45 mm. I think it is clear that we have here an aggregate quite distinct from *Hydrophilus*.

Altogether I have discriminated thirty-five species, but two of these form a distinct new genus on account of the structure of the margins of the wing-cases; the other thirty-three species are arranged in ten groups, the ten groups forming two very distinct sections. In the Munich Catalogue of Coleoptera thirty-two species are recorded under the genus; of these some half-dozen are mere synonyms; one must be rejected as not belonging to the genus; and about half a dozen others cannot be

identified with any species I know. At the end of this paper I have added some short observations on these doubtful names.

SECTION A.

Posterior tibiæ entirely destitute of cilia (or swimming-hairs). This section comprises six groups.

Group 1. *Species having the fissure on the middle of the prosternum open in front as well as below. (Species 1 to 6). In all the other groups the divided prosternum is closed in front.*

The insects combined in this group appear to be extremely closely allied, the distinctions being chiefly in the details of coloration. They all have the upper surface yellow, with metallic green parts on the head, thorax, and elytra: these green marks are placed on the posterior part of the head; on the middle of the thorax; and on the wing-cases, where they are longitudinal stripes or vittæ; in certain species some or all of these metallic marks become of increased extent so as nearly to cover the whole area of the part on which they are situated, but the margins always remain pale. In other respects the species agree very closely. The epipleural margin is punctate, but the upper edge, on which the punctures are placed, is very narrow, so that the punctures readily escape observation, although they are in fact large and placed very close to one another; they bear no visible spines, but when the tip of the finger or the edge of a hard instrument is passed over them they are found to be extremely asperate; they are confined to the posterior half or two-thirds of the margin, no trace of them being visible on the basal portion. The upper inner face of the hind tibia is highly polished, but when examined with a good magnifying-power is seen to be obsoletely sculptured, the shallow punctures being filled up by an extremely fine squamosity. The outer face of the tibia is asperate, with coarse punctures and erect spines, and the line of demarcation between the armed outer face and the smooth inner one is straight, being formed by a series of coarse punctures; the posterior punctures of this series are not closer to one another than are the basal punctures; they do not diverge (or encroach) on the smooth inner face and are not armed with fine erect setæ. The sternal spine is very acuminate, not flat,

much curved away from the body, and is quite as long as the space between the middle and hind coxæ. The pubescent space on the base of the hind femur is of moderate size, covering about one-fourth of the whole area of the lower face. The tooth on the claw of the middle and hind feet of the male is placed quite near the apex, and there is no other external mark of distinction between the sexes, so far as I can observe. The last ventral segment is unarmed, except that there exist two or three elongate setæ in the middle near the hind margin. The uniformity in structure of the species appears very complete, and if it were not for the absence of intermediate forms they might all be considered as varieties of one widely-distributed species.

As regards the peculiarity on which I have specially based the group, I may remark that it was first pointed out by Leconte, and that one effect of the peculiarity is to allow a more complete contraction of the prothorax on to the after-body, owing to the raised mesosternal keel being able to pass slightly beyond the front margin of the fissured prosternum. The group will no doubt ultimately be treated as a distinct genus.

1. *Tropisternus scutellaris*, Cast.

Cast., Hist. Nat., ii., p. 54.

Hydrophilus lepidus, Brullé, Voy. d'Orb., Ins., p. 57.

Brazil. (Buenos Ayres).

This species is very closely allied to *Hydrophilus collaris*, but the metallic lines on the wing-cases are extremely diminished, and, indeed, are represented only by four small, short streaks placed near the suture, two just behind the middle and two near the extremity; one or more of these small streaks is occasionally quite obliterated. The epipleural margin is provided with punctures which, although they do not reach to the shoulder, are more distinct in front than they are in *H. collaris*. The under or inner claw on each of the middle and hind feet is in the male dentate near the extremity; this is the only external sexual character I can detect.

This species appears to be rare.

2. *Hydrophilus collaris*, Fab.

Fab., Ent. Syst., i., p. 184.

Tropisternus collaris, Cast., Hist. Nat., ii., p. 54.

South America, from Caracas to Entre Rios; Panama; Mexico?; St. Domingo?. Panama; Caracas, Cumana; Colombia; Ega, Tapajos; Bahia; Rio de Janeiro; Santa Cruz.

In this species the yellow elytra are marked with longitudinal stripes of a metallic-green lustre. These stripes are four in number, in addition to the suture, which also is green; they are not quite straight, and are usually broader than the spaces of the yellow ground colour by which they are separated; behind the middle two or more of them frequently unite; the 2nd and 3rd of these green stripes are longer behind than the other two, and when carefully examined it is seen that their hinder parts are portions grafted (as it were) on to the anterior portions, there being left a more or less distinct irregularity at the point of juncture, which is an overlapping one; the lateral portion of the wing-cases is always broadly pale.

The species is apparently a very abundant one in South America, and varies a little in colour, but not very much; the metallic mark on the middle of the thorax varies a little in width, and is sometimes a mere line, and is never quite half as broad as it is long, but its width and definiteness are frequently rendered indistinct by its being surrounded by a cloud of fuscous or dark colour, probably the result of decomposition of the prothoracic muscular tissue. The epipleural margin is very fine behind the middle, so that the punctures on it are not easily detected, and cannot be traced at all in front of the hind border of the posterior coxæ.

St. Domingo was given as the locality for an individual in Doué's collection; and in that of the late W. W. Saunders there were several individuals labelled Mexico.

3. *Tropisternus proximus*, n. s.

Superne testaceus, vertice, linea mediali prothoracis, scutello, lineis quatuor elytrorum aliisque fractis interjunctis viridi-metallicis. Long. 9—10 mm.

Cuba.

This differs only from *Hydrophilus collaris*, Fab., by the fact that the green marks I have spoken of in *H. collaris* as being grafted on to the posterior portions of the 2nd and 3rd green lines on the wing-cases are in *T. proximus* not joined thereto, but are continued forwards on the yellow interstice as separate (more or less broken up) lines. In *T. mexicanus* these intercalated lines exist entire, not broken up as in *T. proximus*. Whether this peculiarity of markings really indicates a distinct species I cannot say, but it appears to me at any rate an interesting local race; and I could not say whether, if a race, it is an offset from *Tropisternus mexicanus* or from *Hydrophilus collaris*.

The individuals in my possession are from old French collections, and some of them are labelled "*approximatus*," but I have preferred a shorter trivial name.

4. *Tropisternus mexicanus*, Cast.

Cast., Hist. Nat., ii., p. 54; Sharp, Biol. Cent. Am., i., pt. 2, p. 55, pl. ii., f. 3.

Central America, from Mexico to Nicaragua.

In this species there are six elongate green lines on each wing-case; in some individuals these lines are connected together into one large mass of dark colour by an infuscation or discoloration of the surface, and in such specimens there usually exists also a dark cloud round the central mark on the thorax; examples in this state resemble extremely the North American *H. striolatus*, but the punctuation of the wing-cases is less fine in this latter species. The sculpture of the epipleural margin is quite as indistinct in *T. mexicanus* as it is in *Hydrophilus collaris*.

5. *Hydrophilus striolatus*, Lec.

Lec., Proc. Ac. Phil., 1855, p. 357.

North America. (Southern United States); (Mexico?).

This is very closely allied to *T. mexicanus*, but the punctuation of the wing-cases is evidently coarser and more distinct, and the sculpture of the epipleural margin can be traced further forwards; the yellow intervals separating the green lines are usually very small, and frequently cannot be detected at all; the metallic colour

on the thorax occupies the greater portion of its area, leaving frequently only a narrow irregular border pale. The specimens before me seem to indicate that there may possibly be two distinct species mixed in collections, one characterised by the complete confluence of the metallic lines on the wing-cases, and the large development of the metallic colour on the thorax would then be new. I have an individual of this dark form labelled as being from New York, but I do not know whether this be correct, and Leconte records the species only from the Southern States. The Mexican habitat requires confirmation, as it is given on the authority of an individual from an old French collection labelled "*H. strigatus*, Chevrolat, Mexique."

6. *Tropisternus parananus*, n. s.

Superne viridi-fuscus, pernitidus, limbo testaceo; pedibus testaceis, femoribus basi nigricantibus. Long. 9 mm.

Parana.

This species is similar in colour to *Hydrophilus striolatus*, but in sculpture to *H. collaris*. The head and thorax are of a metallic colour, with the front margin of the former and the sides of the latter yellow. The stripes on the elytra are placed as in the South American species, but are connected by fuscous colour into a large mass of dark colour, leaving only the lateral margin yellow. The sculpture of the epipleural margin is quite as indistinct as it is in *H. collaris*.

I have before me only a single individual.

Group 2. *Sternal spine flat and broad, quite short, not extending further backwards than the first visible ventral suture; maxillary palpi shorter than in any of the other species; setigerous punctures on each side of prothorax agglomerated into a small depression having the appearance of a single large puncture; pubescent area on posterior femur almost absent. (Species 7 to 9).*

The species of this group appear to be rarer than the other *Tropisterni*; their individuals have the upper surface unicolorous, and the epipleural margin is either

crenate-punctate or smooth. I have not found amongst the individuals in my collection any with the claws toothed, and am not aware that any external mark by which the sexes may be distinguished exists.

7. *Tropisternus breviceps*, n. s.

Crassus, latus, sat convexus, niger, nitidus, parum metallescens, palpis concoloribus, crebre subtiliter punctulatus; mento fortiter punctato; elytrorum linea marginali lævigata. Long. 11 mm., lat. $6\frac{1}{2}$ mm.

Brazil (from Reiche's collection under the name of *T. crassus*).

I have before me only a single individual of this peculiar species, remarkable for its short broad form. The palpi are remarkably short, and are dark in colour. The mentum is shining, but is deeply and rather coarsely punctate. The posterior punctures of the clypeal series are reduced to two or three on each side; the punctures near the inner margin of the eye are numerous, but are irregularly placed. The hind tibiæ have a series of punctures bordering their smooth internal face; each of these punctures bears a short fine spine, the series does not extend to the apex, and the terminal punctures are not different from the others. The sternal spine is short and broad, and its apex is carinate in the middle. The last ventral segment is not carinate, but bears at the extremity a minute and short, rather thick, pencil of setæ. The pubescent area of the posterior femur is confined to a small space extending along the anterior margin.

8. *Tropisternus brevicollis*, Sharp.

Sharp, Biol. Cent. Am., i., pt. 2. p. 56, pl. ii., f. 4.

Mexico.

Allied to *T. breviceps*, but of much narrower form, with the surface less punctate, and the clypeal and orbital punctures still more reduced; the mentum is less punctate; the sternal spine not so short and broad, not carinate; the last ventral segment plicate along the middle, the fold, however, but little elevated. The unique individual in my possession was compared with Dejean's collection of *Hydrophilus* by Mulsant at the time this passed into the possession of the Lyons Museum, and was marked as a species "not in Dejean's collection."

9. *Hydrophilus nitidulus*, Brullé.

Brullé, Voy. d'Orb., Ins., p. 55.

Brazil (Rio de Janeiro); (Mexico, in coll. Laferté).

This species is readily to be distinguished from the others of its group by the punctate or crenate epipleural margin, the sculpture not, however, extending to the base. The hind legs are elongate and slender, the marginal series of punctures has the apical punctures so crowded together as to be nearly confluent into a groove, and each bearing a fine, short, erect seta. The apical ventral segment is strongly carinate, and the apex of the carina projects as a short spine.

The individual, supposed to be from Mexico, is of smaller size than the Brazilian examples, and is of more metallic colour, and the apex of the abdominal carina is less spinose. It may prove to belong to a different species. The specimen is unfortunately in very bad condition.

Group 3. *Sternal spine flat and broad, rather short, but extending backwards a little beyond the first ventral suture; maxillary palpi elongate; setigerous punctures on each side of prothorax agglomerated into a small depression; pubescent area on posterior femur of moderate extent; posterior tibia with its smooth inner face limited above by a series of punctures which do not extend to the extremity, the apical punctures crowded so as to be almost confluent into a groove, which diverges slightly on to the polished inner face, and each bearing a fine, short, erect seta. (Species 10 to 13).*

The species of this group are apparently not common, and are very closely allied in all structural points, although one of them is remarkable from the unusual development of the eyes. The size and form of the pubescent area on the hind femur seems very similar in all the species; at the hind margin its limit extends just beyond the apex of the trochanter, and stretches across the femur in an oblique manner, reaching further outwards as it goes forwards, so that on the front margin it extends about two-fifths of the length of the femur; altogether it covers about one-fourth of the whole area of the lower face of the femur.

10. *Tropisternus oculatus*, Sharp.

Sharp, Biol. Cent. Am., i., pt. 2, p. 58, pl. ii., f. 6.

Mexico; South America; Colombia.

This species may be readily distinguished from all others known to me by the larger eyes; the upper surface is of an olivaceous tint, and the maxillary palpi, as well as the ventral spine, are very elongate. In the individual labelled "New Grenada" in my collection the systematic punctures near the side of the thorax are not concentrated into so minute a fovea as they are in other individuals. The habitat Mexico is undoubtedly correct, Mr. Godman having recently received two individuals from Presidio; the species existed in Doué's collection, labelled "*H. congener*, South America"; it was also in Reiche's collection, labelled "*H. xanthopus*, Reiche, Colombie," and in Laferté's, where it was ticketed "New Grenada."

11. *Tropisternus flavipalpis*, n. s.

Superne niger, metallico-tinctus, antennarum basi palpisque testaceis, pedibus rufis, femoribus basi nigris; subtilius punctatus, pernitidus; elytrorum linea marginali subtiliter crenato-punctata, in dimidio basali lævigata; abdominis apice sat longe spinoso. Long. 11 mm., lat. $6\frac{1}{3}$ mm.

Mexico (from W. W. Saunders' collection).

This is very similar to *T. oculatus*, but the eyes are not so largely developed, and the ventral spine is less elongate. Although I have described the epipleural line as without punctures on the anterior half, yet by careful examination, with a very strong lens, of a perfectly cleaned specimen, very minute punctures can be detected. The only individual I have seen is apparently a male, but the tooth on the claws is placed at the extreme base, on the swollen part of the claw, and thus is not easily detected.

12. *Tropisternus chontalensis*, Sharp.

Sharp, Biol. Cent. Am., i., pt. 2, p. 57.

Central America.

This is extremely close to *T. flavipalpis*, but the legs are darker, and the apical ventral segment bears a very

strongly elevated carina, the apex of which is liberated so as to form only a very short spine. The unique individual appears to be a female; at any rate I can detect no trace of a tooth on the claws.

13. *Tropisternus robustus*, n. s.

Niger, superne subviolaceo-tinctus, antennarum basi palpisque testaceis; subtilius punctatus, pernitidus, elytris versus apicem fere lævigatis; elytrorum linea marginali fortiter punctata; abdominis apice longius spinoso. Long. 12 mm., lat. 7 mm.

Ecuador (found by Mr. Buckley).

Var. Femoribus versus apicem rufescentibus, abdominis spina paulo minore. (Hab. Cayenne?; from Doué's collection under the name of *Hydrophilus femoratus*, Buquet).

This species is rather more robustly built than its allies, and may be readily identified by the sculpture of the epipleural margin, which is conspicuous along the whole length. I have not detected a tooth, in the few specimens at my disposal, on the claws. The two individuals found by Mr. Buckley have the legs darker than those from the old French collections, and it is possible that ultimately these latter may prove distinct.

Group 4. *Sternal spine very elongate and not in the least flattened, much curved away from the body; other characters as in Group 3. A single species only is yet known, viz. :—*

14. *Hydrophilus latus*, Brullé.

Brullé, Voy. d'Orb., Ins., p. 55, pl. iv., f. 3.

Monte Video.

This species is an extremely remarkable one from the large size of its individuals and the greatly developed sternal spine; thus it can be confounded with none other of the species without cilia on the hind tibiæ. I find a variation in the length of the sternal spine, which in certain individuals extends quite as far back as the third ventral suture, while in others it is a little shorter; I think it possible these latter may be the females. I have not detected any other character by which I can

distinguish the sexes. The epipleural margin is conspicuously punctured up to the base, and the ventral spine is elongate and rather slender.

Group 5. *Sternal spine broad and rather flat and short, but extending beyond the first ventral suture; pubescent area of posterior femur of large extent, occupying about one-half of the lower face of the femur; last ventral segment armed with elongate spine; stature large. (Species 15 to 17).*

15. *Hydrophilus apicipalpis*, Chev.

Chev., Col. Mex., fasc. 3.

Mexico; Guatemala; Colombia; Cayenne.

This species is of large stature, and usually black in colour, with a slight æneous tinge, but occasionally the surface shows somewhat brilliant metallic reflections; the punctuation of the wing-cases is very dense and even, and, although very fine, is quite distinct, and there may always be detected (when a specimen is well cleaned) on each wing-case the rudiments of seven or eight striæ formed by lines of very fine punctures. The form is peculiar, the hind portion of the wing-cases is more elongate than usual, and so the posterior part of the body appears more acuminate. The male has a very fine tooth at the base of the under claw on the middle and hind feet.

16. *Tropisternus chalybeus*, Cast.

Cast., Hist. Nat. ii., p. 53.

T. nitidus, Cast., l. c.

Hydrophilus chalybeatus, Curt., Trans. Linn. Soc. xix., p. 42.

Mexico; Guatemala; Panama; Colombia; Cayenne; Amazons (from water standing in a canoe, Rio Sappo, 21st Nov., 1874, Prof. Trail); Brazil; Guadeloupe.

This species is readily distinguished by the beautiful colour of the upper surface, which is violet, purple, or blue. It varies a good deal in size and in the colour of the legs, but I am unable at present to distinguish more than one species. I have preferred the trivial name of *chalybeus* to that of *nitidus*, although the two were published at the same time, because there exists also a *nitidulus* and a *nitens* in the genus.

17. *Tropisternus crassus*, Sharp.

Sharp, Biol. Cent. Am., i., pt. 2, p. 55.

Guatemala.

Very closely allied to *T. chalybeus*, and approached on one or more points by some of the varieties of that species, but of shorter and broader form, with the legs shorter, and the pubescent area on the femora comparatively a little larger.

Group 6. *Sternal spine not flat, acuminate, of moderate length, extending nearly or quite to 2nd ventral suture; pubescent area of posterior femur of moderate extent (occupying about one-fourth of the whole area of the lower face); last ventral segment unarmed. (Species 18 and 19).*

The two species of this group are not closely allied. *T. nitens* is variable in size and form, and is more likely to cause difficulty in its identification than any other species of the genus, owing to the superficial resemblance it possesses to species of other groups. *T. ovalis*, on the other hand, is, by its small size and peculiar form, more readily distinguished at a glance than any other species of the genus. In both species the epipleural margin is punctate even at the base.

18. *Tropisternus nitens*, Cast.

Cast., Hist. Nat., ii., p. 54.

From Mexico to Rio de Janeiro. (Mexico; Guatemala; Colombia; Venezuela; Demerara; Bahia; Rio de Janeiro; Santa Cruz).

In this species the 6th joint of the antenna is slightly larger than in most others of the genus, but is a good deal smaller than it is in *T. ovalis*. It is one of the most abundant species of the genus, and varies much; the length is between $6\frac{1}{2}$ mm. and $10\frac{1}{2}$ mm.; the colour of the upper surface is usually shining black, but sometimes is strongly metallic; the form is rather narrow, and sometimes attenuate behind, sometimes rounded.

19. *Tropisternus ovalis*, Cast.

Cast., Hist. Nat., ii., p. 54; Sharp, Biol. Cent. Am., i., pt. 2, pl. ii., f. 5.

From Mexico to Bahia. Oaxaca; Guatemala; Colombia (Coll. Reiche); Bahia (Coll. Castlenau).

The individuals of this species are of smaller size than others of the genus, except the smallest individuals of *T. nitens*; the form is peculiarly short and broad, the greatest width being near the extremity behind, and the punctuation of the upper surface is more distinct and less dense than usual; these characters, in combination with the unusual development of the 6th joint of the antenna, permit the easy identification of the species; it appears to be rare in collections.

SECTION B.

Posterior tibiæ with an elongate series of swimming-hairs placed in a groove extending along the outer margin of their upper-inner face, from the knee to near the extremity.

This section comprises groups 7 to 10. The species in this section are more closely allied *inter se* than are many of the species of the A section, and I have separated them into groups merely to facilitate the determination of species.

Group 7. *Upper surface without yellow cincture, the margins being nearly or quite concolorous; epipleural margin distinctly punctate from the humeral angle to near the extremity. (Species 20 to 27).*

In this group I have placed eight species; the first two of these, *Tropisternus concolor* and *Hydrophilus ellipticus*, have the lateral systematic punctures on the thorax reduced to one or two on each side, while in all the other species they form a short, sometimes irregular, line of five or six punctures. In all the species the sternal spine is of moderate length, or is rather elongate; it is never short or flattened beneath; the pubescent area at the base of the hind femur is either small or very small. The armature of the last ventral segment is very variable in this group of species.

20. *Tropisternus concolor*, Sharp.

Sharp, Biol. Cent. Am., i., pt. 2, p. 57.

Mexico and Guatemala.

This species, by the deep coarse punctures on the epipleural margin, resembles *T. nigrinus*, but *T. concolor* is of shorter and broader form, more rounded behind, with the sculpture of the upper surface excessively fine, and the systematic punctures at the side of the thorax are more concentrated, for, while in *T. nigrinus* they form a moderately short line, in *T. concolor* they are nearly or quite concentrated into a group placed in a small round depression.

21. *Hydrophilus ellipticus*, Lec.

Lec., Proc. Ac. Phil., 1855, p. 368.

North America (New Mexico, California, Utah).

This species is readily distinguished from its North American allies by the fact that the systematic punctures on the side of the thorax are much reduced, there being only two, placed very near one another (or even amalgamated), but occasionally at a distance on one or both sides of these may be seen another much finer puncture, marking the beginning or end of the series as it exists in other species. The form is broader and more obtuse behind than it is in *H. californicus* and *H. sublaevis*; the upper surface is very polished, and its sculpture extremely fine; the punctures on the epipleural margin are very distinct from the shoulder backwards; the sternal spine is formed much as in *H. californicus*; on the last ventral segment there is only a very obscure carina, and the pubescent area at the base of the posterior femur is small; the legs are dark, but marked with yellow. There appears to be little or no sexual difference in the sculpture of the mentum.

I have seen only three individuals, from California and Utah.

22. *Tropisternus nigrinus*, Boh.

Boh., Eugen. Resa, Coleoptera, p. 22.

Brazil; Rio Grande, Parana, Corrientes; Monte Video (*vide* Boheman).

This species bears an extreme resemblance to some of the varieties of *T. nitens*, but can be readily distinguished by the ciliate posterior tibiae. The sternal spine is rather short and stout, not extending quite so far as the hind margin of the 2nd ventral segment; it is punctate, but not quite flat, and is thick in the vertical direction. The apical ventral segment has only the rudiment of a carina. The punctuation of the elytra is very fine, that of the epipleural margin quite coarse, even at the base. The legs are rather short and stout, usually dark in colour, and the upper face of the hind tibia is rather closely squamose-punctate.

I have had some doubt in determining this to be Boheman's *T. nigrinus*, but, although he does not allude to the important facts as to the condition of the tibiae, epipleural margin, &c., his description on the whole accords better with this species than with any other I know, and I have therefore applied his name to it. Most of the individuals I have seen are from old French collections, and are labelled either "*ebenus*, Dej.," or "*geniculatus*, Klug."

23. *Hydrophilus ochripes*, Curt.

Curt., Trans. Linn. Soc., xix. (1845), p. 443.

Chili; Bolivia; Southern Brazil; La Plata; Buenos Ayres; Monte Video; Corrientes; Rio de Janeiro.

In this species the legs are nearly always yellow; the punctuation of the upper surface is fine and regular, but quite distinct; although the epipleural margin is not broad, its punctuation is quite distinct even at the shoulder; the sternal spine is slender and elongate, reaching as far as the extremity of the 2nd ventral segment, and is without punctures; there is only a very faint indication of any carina on the last ventral segment. The more slender elongate and glabrous sternal spine readily distinguishes this species from *T. nigrinus*.

The description of Curtis, though brief and without allusion to any of the most important characters, applies better to this species than to any other known to me, and as the habitat he gives ("Valparaiso and Brazil") also agrees, I have used his name without much hesitation; he describes the upper surface as being "piceous, with a violet tint"; this is sometimes the case, but more frequently it is nearly pure shining black.

The species appears to be a common one.

24. *Hydrophilus subcleris*, Lec.

Lec., Proc. Ac. Phil., 1855, p. 368.

Hydrophilus quadristriatus, Horn, Trans. Am. Ent. Soc., 1871, p. 331.

North America.

This species appears to be closely allied to *H. californicus*, but to be narrower and smaller, and with the pubescent area at the base of the hind femur rather larger; the apical ventral segment has a strongly elevated carina, the apex of which projects beyond the extremity of the segment. There seems to be no sexual difference in the sculpture of the mentum. In other respects the species seems very similar to *H. californicus*.

I have seen only a pair of the species, so can form no opinion as to its variation; in both these individuals the legs are nearly entirely pale yellow.

25. *Hydrophilus californicus*, Lec.

Lec., Proc. Ac. Phil., 1855, p. 367.

North America (California).

This species may be readily distinguished from *H. glaber* by its less punctate upper surface, and by the last ventral segment bearing only a carina or plica instead of the spine existing in *H. glaber*. The systematic punctures on the side of the prothorax form a somewhat short and irregular line; the sculpture of the epipleural margin is distinct from the shoulder backwards. The sternal spine is curved away from the body, and is elongate, narrow, and deep, formed, in fact, as in *H. glaber*, but scarcely so long and stout; the apical ventral segment bears a plica or carina; and the pubescent area at the base of the hind femur is quite small.

There is a striking sexual disparity in the sculpture of the mentum and the lateral portions of the submentum, the punctuation of these parts being much denser in the male than in the female.

The species is variable, and there may be more than one mixed under the name. In one form there is a well-marked development of coarse punctuation on the sides

of the elytra towards the extremity, while in other specimens this additional sculpture is quite absent; this latter form is usually of darker and less metallic colour.

26. *Hydrophilus glaber* (Herbst ?), Lec.

Lec., Proc. Ac. Phil., 1855, p. 368.

North America; Haiti.

In this species the punctuation of the upper surface is quite distinct and evenly distributed, but does not give rise to a dull appearance; the systematic punctures on the prothorax form a somewhat short line; the sternal spine is elongate and much curved away from the body, and is rounded beneath, not flattened; the apical ventral segment bears a very distinct free spine. The epipleural sculpture is coarse and distinct from the base to near the apex.

It appears to be variable, or there may be more than one species under the name; the pubescent area of the posterior femur is sometimes quite small, but in other cases is rather more extensive; the ventral spine also varies somewhat in its development.

It seems scarcely possibly that this species can be that intended by Herbst in his description of *Hydrophilus glaber*; he calls his insect "*glaberrimus*," and repeats that it has the head, thorax, and elytra quite impunctate, whereas the punctuation of the upper surface is in this species quite conspicuous, and more developed than in any other of the genus, except *H. mixtus*, Lec.

It appears to be abundant throughout the United States of North America.

27. *Hydrophilus mixtus*, Lec.

Lec., Proc. Ac. Phil., 1855, p. 368.

North America; United States; New York.

This is extremely closely allied to *H. glaber*, but the punctuation of the upper surface is much denser, so that the elytra towards the sides and extremity are dull. The pubescent area on the hind femur is larger than in some of the varieties of *H. glaber*, but other forms of this latter species have the area quite as extensive as in *H. mixtus*.

Group 8. *Upper surface with a yellow marginal cincture; epipleural margin rather finely punctate, the punctures distinct, however, even at the base. (Species 28 and 29).*

Two species are included in this group; they do not differ in any important respect from Group 7, but I have separated them because the yellow marginal band gives them a rather different appearance.

28. *Hydrophilus lateralis*, Fab.

Fab., Syst. Ent., p. 228.

America, North and South, including the Antilles. United States, from New York southwards, abundant; Mexico and Central America, abundant; Cuba, Antigua, St. Thomas; Rio Janeiro, Constanca, Buenos Ayres, Chili.

In this species the form is rather slender and elongate, and the upper surface shining, closely, very finely, and evenly punctate; the yellow cincture is subject to a good deal of variation in its width and regularity, but usually is narrower on the wing-cases than on the thorax, becoming on the former narrower as it proceeds backwards, so that it nearly entirely disappears before reaching the suture at the apex; the systematic punctures on the side of the thorax are fine and form a rather short irregular line; the epipleural margin is narrow, so that the punctures on it are not coarse, but they are quite distinct from the shoulder backwards; the sternal spine is rather elongate and slender, and the apical ventral segment is either unarmed or bears a carina or plica of variable elevation and length; the pubescent area at the base of the hind femur is quite small; the legs are yellow, with the femora infusate to a variable extent. The male has a distinct tooth on the inner claw of the middle and posterior feet, and this is the only certain external sexual mark I can detect.

The species varies much in the breadth and regularity of the yellow cincture on the head, thorax, and wing-cases; sometimes it is broader on one or other of these, and sometimes, but rarely, on the wing-case it becomes rather broader and more irregular at the apex. The armature of the last ventral plate also varies greatly;

sometimes there is only a scarcely visible elevation bearing two or three setæ, while in other cases there is a strongly-elevated plicæ, the extremity of which projects backwards to a greater or less extent as a free spine.

I have been quite unable to arrange the numerous variations in such a way as to indicate distinct species; nevertheless it may prove that there is more than one truly distinct species mixed under the name. In South America the last ventral segment is apparently always simple, and in North America is never quite simple, but always more or less distinctly carinate or subspinose; in Mexico and Central America there exists a great deal of variation in this character.

29. *Hydrophilus dorsalis*, Brullé.

Brullé, Voy. d'Orb., p. 57, pl. 4, f. 61.

Hydrophilus limbalis, Lec., Proc. Ac. Phil., 1865, p. 367.

America, North and South. Arizona, California, New Grenada, Peru; Chili, Corrientes (*teste* Brullé).

So far as I can see, this insect is only different from *H. lateralis* by the greater extension of the yellow colour of the upper surface, the lateral band of the wing-case occupying about two-fifths of the width, and at the base nearly always extending inwards towards the scutellum.

If I may express an opinion, from the few specimens I have seen, I should say that, as in *H. lateralis*, the last ventral segment has its carina more developed in North America than in South America.

Group 9. *Upper surface without a yellow cincture; epipleural margin with rather fine and somewhat distant punctures at or behind the middle, but without sculpture at the shoulder.* (Species 30 to 32).

The three species I have here associated are separated from Group 7 merely as a matter of convenience in determining the species; *T. xanthopus*, in fact, has not the epipleuræ quite impunctate at the base, careful examination revealing fine punctures on this part.

30. *Tropisternus xanthopus*, Sharp.

Sharp, Biol. Cent. Am., i., pt. 2, p. 59.

Mexico (Oaxaca).

In this species also the legs are yellow. It is closely allied to *H. ochripes*, Curt., but is of more elongate and narrow form, the punctuation of the wing-cases is more distinct, and the sternal spine is shorter, though otherwise similar; the epipleural margin is narrow, and its sculpture on the basal portion obsolete.

31. *Tropisternus lancifer*, n. s.

Niger, parum metallescens, palpis antennarumque basi testaceis, pedibus rufis; latiusculus, minus convexus, capite thoraceque sat fortiter, elytris parce subtilissime punctatis; margine pleurali antice lævi, ad medium parce parum distincte punctato; spina sternali elongata, tenui; abdominis apice carina obscura sed ad marginem posteriorem distincte elevata. Long. 10—11 mm., lat. $5\frac{1}{2}$ mm.

Colombia.

Punctuation of head and thorax quite distinct and not close, their systematic punctures deeply impressed, those on the side of the thorax forming a short line; wing-cases sparingly and extremely finely punctulate; the epipleural margin is not punctate at the base, behind the middle it is narrow, and bears not very distinct distant punctures. The legs are elongate and slender; the sternal spine is elongate and slender, extending a little beyond the 2nd ventral suture; on the last ventral segment there is a short carina, which at the apex is distinctly elevated.

The species is readily distinguished from *T. ochripes* by the indistinct punctuation of the epipleural margin.

32. *Tropisternus fuscitarsis*, Sharp.

Sharp, Biol. Cent. Am., i., pt. 2, p. 58.

Mexico, Guatemala; Colombia (*vide* Mus. Castlenau).

This is a species in which the colour of the legs appears variable. It has the punctuation of the epipleuræ indistinct, as in *T. lancifer*, but is readily distinguished from that species by the shorter, more depla-

nate, sternal spine, and by the denser and more even punctuation of the upper surface, there being in *T. fuscitarsis* but little difference between the punctuation of the thorax and the wing-cases, this being very close and fine on both these parts, and even denser on the thorax than on the elytra. The systematic punctures on the side of the prothorax seem to be in this species more variable than usual; sometimes there are three or four of them forming a short irregular line, while more usually they are concentrated into a small fossa.

Group 10. *Epipleural margin quite destitute of sculpture or spines.*

The interesting species isolated to form this group makes a slight approximation to the genus *Pleurhomus* by the quite smooth epipleural margin.

33. *Tropisternus tinctus*, Sharp.

Sharp, Biol. Cent. Am., i., pt. 2, p. 59.

Mexico.

This species is readily identified by the complete absence of sculpture on the epipleural margin, and by the fact that the edge of the epipleura on the basal portion of the wing-case, when seen beneath, forms a less sharp edge than usual. There is an extreme sexual difference in the sculpture of the mentum, this part in the male being densely and finely rugulose-punctate and opaque.

PLEURHOMUS, n. g.

Structura fere generis *Tropisterni* sed elytrorum epipleuris pone coxas posteriores omnino angustis, haud ad faciem elytri interiorem applicatis; margine epipleurali omnino lævigato.

I have separated two species from the other *Tropisterni* on account of a peculiar structure of the margin of the wing-case. In the species of *Tropisternus* the epipleura behind the posterior coxæ is folded in, so that a line (which is the inner or lower margin of the epipleura) is seen running along the inner face of the wing-case at a little distance from its outer edge. In the two species of *Pleurhomus* this is not the case; the epipleura behind the

coxa becomes gradually narrower, but is not so abruptly turned in, till just before the extremity, where it is folded in and applied to the inner face, as in *Tropisternus*.

The two species are peculiar by their rather broad form, much attenuate behind; they are very distinct from one another, *Tropisternus obscurus* having the swimming-legs rather stout and their tibiæ ciliate, whereas in *Pleurhomus sahlbergi* the swimming-legs are slender and their tibiæ entirely destitute of ciliæ; thus the two species form two sections similar to what obtains in *Tropisternus*. In both species the pubescent area at the base of the hind femur is quite small.

1. *Pleurhomus sahlbergi*, n. s.

Ovalis, convexus, posterius attenuatus, pernitidus, supra fusco-æneus, antennis, palpis pedibusque anterioribus testaceis, pedibus posterioribus piceis; elytris sparsim punctatis. Long. $6\frac{1}{2}$ mm., lat. $3\frac{1}{2}$ mm.

Brazil.

The punctuation of the upper surface in this species is quite distinct, but is rather more sparing than usual, especially on the wing-cases, where, too, the punctures are not all of one size, there being distinctly larger punctures scattered amongst the finer ones. The systematic punctures on the side of the thorax form a short line, and the epipleural margin is without the least trace of sculpture or spines. The sternal spine is short, flat, and punctate, and there is not the least trace of any carina on the last ventral segment. The hind legs are very slender, the upper-inner face of their tibiæ is extremely polished and without any trace of ciliation.

I have a single individual of this remarkable little species sent to me by Prof. Sahlberg, of Helsingfors, as No. 2881; it was discovered by his father at Santa Rita, in Brazil, in September, 1850.

2. *Tropisternus obscurus*, Sharp.

Sharp, Biol. Cent. Am., i., pt. 2, p. 60, pl. ii., f. 7.

Guatemala.

In this species the punctuation of the upper surface is very fine, and is evenly distributed, except that it is denser on the head and thorax than it is on the wing-cases; the systematic punctures on the side of the

prothorax form a slightly irregular line; the epipleural margin is entirely without sculpture or spines; the swimming-legs are moderately stout, and their tibiæ possess a series of swimming-hairs parallel with their upper edge; the sternal spine is of moderate length and not flattened; the apical ventral segment bears a setigerous tubercle near the hind margin.

As regards the following species, or rather names of supposed species, I can give no information beyond the appended hints:—

Tropisternus agilis, Cast., Hist. Nat., ii., p. 53. Described from St. Vincent.—I have not seen any specimens from the island in question, but am inclined to think from Castlenau's few words of description that this may be a distinct species from any known to me.

T. binotatus, Walker, Nat. Vancouver, ii., 1866, p. 318. Vancouver's Island.—Leconte has identified this as being *H. limbalis*, Lec. (*cf.* Ann. Nat. Hist., 4 ser., vi., p. 400), so the name should pass into synonymy.

T. blandus, Chev., Ann. Soc. Ent. Fr., 1863, p. 205. Cuba.—The description of this species does not enable me to form any opinion as to whether it is valid or the name a synonym.

Hydrophilus chalybeatus, Curt., Trans. Linn. Soc., xix., p. 442. Brazil.—This is, I think, a mere synonym of *T. chalybeus*, Cast.

Tropisternus lævigatus, Boh., Eugen. Resa, p. 22. Rio de Janeiro.—I think this will prove to be a species unknown to me, unless it be a variety of *T. ovalis*, Cast.

Hydrophilus lævis, Sturm, Cat., p. 64, pl. 2, f. 13. Cayenne and Brazil.—I find it quite impossible to come to any conclusion as to what species this refers to.

H. lepidus, Brullé, Voy. d'Orb., p. 57, pl. 4, f. 4. Entre Rios.—This is clearly the same as *T. scutellaris*, Cast., and, as I believe, though of this I am not quite sure, that the latter name has priority, I have adopted it.

H. limbalis, Lec., Proc. Ac. Phil., 1855, p. 367.—Being unable to find any specific difference between North American and South American individuals, I consider this to be a synonym of *H. dorsalis*, Brullé.

H. limbatus, Brullé, Voy. d'Orb., p. 56. Brazil.—Brullé seems certainly to have described the Fabrician *H. lateralis* over again under this name, which (unless some one shall point out characters to distinguish the varieties of *H. lateralis* as distinct species) must fall into synonymy.

Tropisternus mergus, Redt., Hüg. Kasch., iv., 2, p. 514. Hindostan.—As the genus *Tropisternus* is exclusively South American, there is clearly some error in assigning this species to it, and I have therefore not occupied myself with it.

T. nitidus, Cast., Hist. Nat., ii., p. 53. Guadeloupe.—This is, I consider, a synonym of the same author's *T. chalybeus*: the dozen words of description do not indicate any distinction.

Hydrophilus quadristriatus, Horn, Trans. Am. Ent. Soc., 1871, p. 331.—This has already been recorded by its author as a synonym of *H. sublævis*, Lec.

Tropisternus sellatus, Cast., *l. c.*, p. 54.—For the present this must remain a doubtful species; the description may possibly refer to an individual of *H. collaris*, discoloured by decay.

Hydrophilus setiger, Germ., Ins. Spec. Nov., p. 95. Buenos Ayres.—This cannot with certainty be identified from the description, which consists almost entirely of characters common to the whole of the genus. The expression "thoracis lateribus fulvis" seems to be quite exceptional, but may perhaps refer to the inflexed margin, which is yellowish or fulvescent in numerous species.